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COURSEWARE INC SAN DIEGO CALIF
DATA COLLECTION AND MANAGEMENT FORMS REPORT. (U)
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F-16 AIRCREW TRAINING DEVELOPMENT PROJECT.

Contract No. F02604-79-C8875

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DATA COLLECTION AND MANAGEMENT
FORMS REPORT

DEVELOPMENT REPORT No. 3
MARCH 1981

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Prepared in fulfillment of CDRL no. B007

by

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PREFACE

This report was created for the F-16 Aircrew Training Development Project contract no. F02604-79-C8875 for the Tactical Air Command to comply with the requirements of CDRL no. B007. The project entailed the design and development of an instructional system for the F16 RTU and instructor pilots. During the course of the project, a series of development reports was issued describing processes and products. A list of those reports follows this page. The user is referred to Report No. 34, A Users Guide to the F-16 Training Development Reports, for an overview and explanation of the series, and Report No. 35, F-16 Final Report, for an overview of the Instructional System Development Project.

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F-16 AIRCREW TRAINING
DEVELOPMENT PROJECT REPORTS

Copies of these reports may be obtained by writing the Defense Technical Information Center, Cameron Station, Alexandria, Virginia 22314. All reports were reviewed and updated in March 81.

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Wild, M., & Farrow, D.R. Data collection and management forms report (F-16 Development Report No. 3). San Diego, Calif.: Courseware, Inc., September 1977, March 1981.

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- Wilcox, W.C., McNabb, W.J., & Farrow, D.R. F-16 implementation and management plan report (F-16 Development Report No. 18). San Diego, Calif.: Courseware, Inc., October 1978, March 1981.
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- Gibbons, A.S., Axtell, R.H., & Hughes, J.A. F-16 media selection and utilization plan report (F-16 Development Report No. 10). San Diego, Calif.: Courseware, Inc., October 1978, March 1981.
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Farrow, D.R., & Clark, J. F-16 Final Report (F-16 Development Report No. 35). San Diego, Calif.: Courseware, Inc., January 1981, March 1981.

EXECUTIVE SUMMARY

↓ This report details the forms developed for organizing and storing the voluminous ISD data/information generated by the F-16 training project. The forms are designed to accommodate continually changing data relative to hundreds of tasks, instructional objectives, and production elements. Although the forms are the product of experience in manually operated systems, they are compatible with computer based data systems. The formats used have been changed and modified as necessary as F-16 ISD procedures have changed.

↪ This report presents a sample and description of the forms used in the analysis and design phases of the program, that is (1) tasks listing and objectives hierarchy analysis (task listing/objectives hierarchy worksheet and task specification worksheet); (2) media selection (hands-on media selection forms, media by capability matrices, media priority by segment sheet, and media selection tally sheet); (3) personnel management (weekly time summary sheet); (4) production management (production management forms, weekly progress report, and production tracking chart); and (5) pre-implementation evaluation (student attitude questionnaire).

The fact that the forms illustrated and described were designed and redesigned during the F-16 project is not of concern, since forms are management tools to serve the thought processes, and not vice versa. Tools in any industry are designed/re-designed to meet the changing requirements of that industry.

↪ Despite their susceptibility to change, it is recommended that great care be taken in providing the data called for by the forms because they are the product of experience gained from other ISD projects. Also, by early development of these forms, data collection was timely and systematic, resulting in the savings of time and money.

Data bases required for an automated ISD management system have all been defined, should automation be implemented after the contractor has left the F-16 training program.

↑

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DATA COLLECTION AND MANAGEMENT FORMS REPORT

1.0 INTRODUCTION

This report is in response to a contract requirement to specify data collection and data management forms to be used to support development of F-16 pilot training. The mountains of data generated during a project of the F-16's scope require extreme care in collection and handling. Scores of continually changing data items relative to hundreds of tasks, instructional objectives, and production elements, must be recorded, accessed, updated, and summarized. The forms contained in this report are designed for maximum usefulness in support of these data management requirements. The forms are the product of experience in manually operated data systems.

Many different data forms are employed during the life of an ISD project. The need for them arises directly out of the processes they support. Because of this, the structure of this report roughly conforms to the ISD processes. It is divided into the following major parts:

Task Listing/Objectives Hierarchy Analysis Forms

Media Selection Forms

Personnel Management Forms

Production Management Forms

Evaluation Before Implementation Forms

The forms developed and used by the project are provided and discussed in two development reports: Data collection and management forms report (#3) and F-16 implementation and management plan report (#18). This report includes the forms used during the analysis, design and development phases of the program, prior to course implementation, while report #18 includes those forms used for course implementation, evaluation and revision.

It is should be pointed out that no matter how well designed a set of forms and management aids may be, they still will need to be used with care and thoughtfulness. The clearest data collection form cannot collect its own data. Nor can the most efficient management scheme, on paper or on computer, drive itself. The data forms described herein will be used as a tool by the developers for capturing and systematizing the decisions, information, and creative ideas which evolve during the development of the F-16 training system.

2.0 TASK LISTING AND OBJECTIVES HIERARCHY ANALYSIS

During task listing, an inventory of the tasks to be trained was developed, and conditions, standards and appropriate reference materials specified. Once the tasks to be learned were identified and specifications developed, each task was subjected to objectives hierarchy analysis to yield a set of instructional objectives that build up student behavior in a progression of steps required to accomplish performance objectives. Through this process, the required skills and knowledges were identified which were necessary prerequisites to mastery of the performance objectives. The end result of the process was a series of maps illustrating the order in which objectives build on one another (i.e., their hierarchical relation).

The forms developed were a Task Listing/Objectives Hierarchy Worksheet and a Task Specification Worksheet.

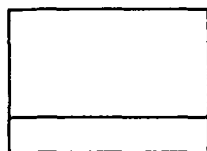
2.1 TASK LISTING/OBJECTIVES HIERARCHY WORKSHEET

The Task Listing/Objectives Hierarchy Worksheets were constructed by SME/Writer teams. The process started with a higher order task, i.e., perform a MIL/MAX AB Power Departure, followed by the necessary sub-tasks, i.e., perform Level-off. The end result was a combination task listing and objectives hierarchy portrayed as a series of connected boxes which demonstrated the behaviors necessary to accomplish the task.

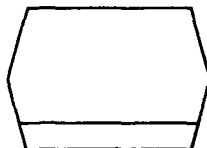
The behavior statement goes in the top part of each box and a reference number goes in the bottom part. The representation system for the objectives hierarchies is described below.



1. This symbol is used to indicate the objective that is immediately superordinate to the objectives on a given hierarchy page. This is done to orient the reader to the location of the superordinate objectives in the total objectives hierarchy.



2. This symbol is used to indicate an objective analyzed on a hierarchy page.



3. The hex box is used to indicate an objective which is further analyzed on a subsequent hierarchy diagram page. An objective so denoted will be the first solid line rectangular box on the subsequent hierarchy diagram page.

2.2 TASK SPECIFICATION WORKSHEET

The Task Specification Worksheet is headed with the task number and behavior, i.e., task number 1.1.5, Perform Mission Briefing (flight lead). The information to be filled in (by SMEs) included conditions, standards, a description of required steps and reference materials. The information contained was used to generate computer printouts of each task and its specifications.

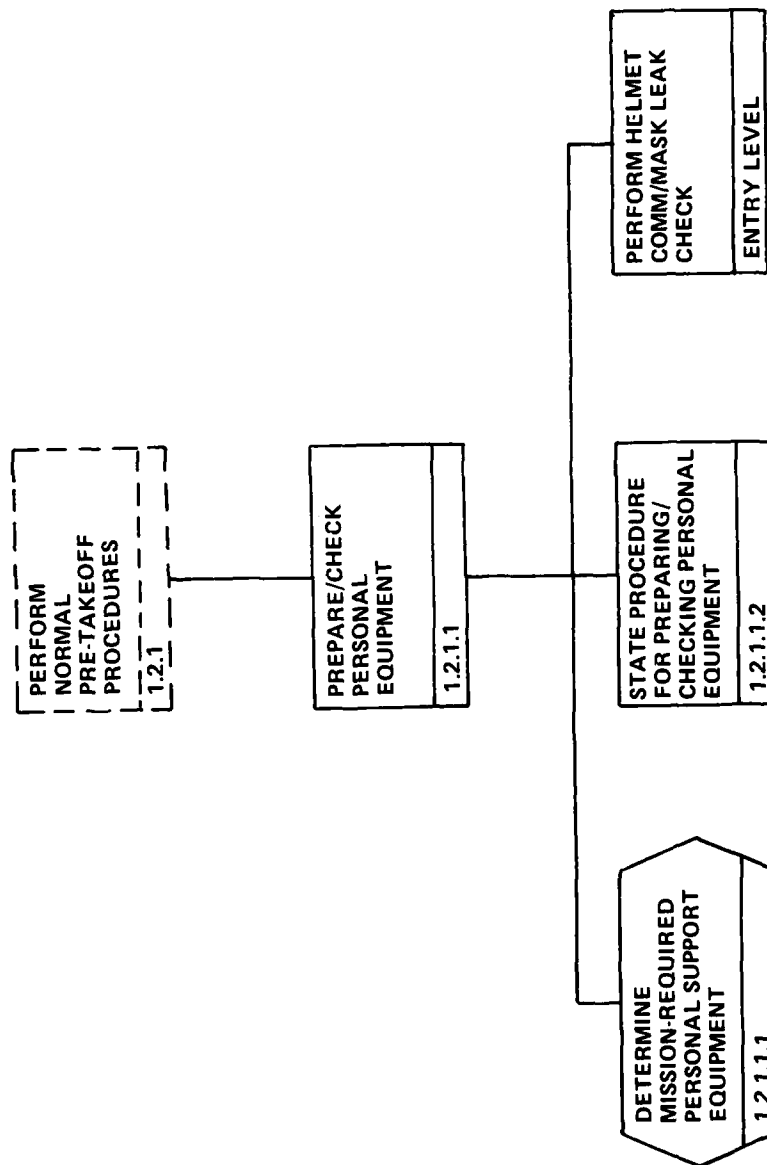


FIGURE 2.1 TASK LISTING/OBJECTIVES HIERARCHY WORKSHEET

BEHAVIOR:

Conditions: (Avoid Stating Obvious Conditions)

Info Source For:

Info Source For:

3. Activity

4. Ext. Environment

5. Aids

6. Prod. of Prev. Tasks

7. Initiation Cues

Systems Presenting Cues:

Standard (Assume Accurate Measurement)

1. Authority

2. Perf. Precision

3. Comp. Accuracy

Steps:

Systems Presenting Cues:

Systems Receiving Manipulations:

Enabling Tasks

Life	ACFT	MSN	None

Criticality of
Correct Perf.

A horizontal number line with four tick marks. Below the line, the numbers 4, 3, 2, and 1 are written from left to right, corresponding to the tick marks.

Difficulty

Reference

Actual

Recommended

Source

Common Mistakes:

Danger

high
low

6

3.0 MEDIA SELECTION

Once all the learning objectives have been defined, the most appropriate media for teaching each objective must be determined, as well as acceptable alternate media. This information is used, along with scheduling and resources information, to determine the final media mix for the syllabus. The results of this study can also have a minor influence to the sequencing of learning objectives in the syllabus. The media selection process was carried out for both hands-on objectives and academic objectives. The forms used consisted of media matrices, an Academic Media Selection Form, a Media Priority by Segment Sheet, and a Media Selection Tally Sheet. For the hands-on objectives two matrices were utilized: A Device by Capability Matrix and a Hands-on Objective by Media Characteristics Matrix. The academic matrix used was a Media by Capability Matrix.

3.1 HANDS-ON MEDIA SELECTION FORMS

The Device by Capability Matrix was designed with the devices, i.e., panel mockup 1:1, listed along the top row and the capabilities, i.e., physical layout characteristics, conformity with shape, listed down the left side. An "x" was used to indicate that a device did possess a certain capability.

The Hands-on Media Selection Worksheet was designed with blank columns along the top (to be filled in with the objective numbers) and media characteristics, i.e., physical layout characteristics, conformity with shape, listed down the left side. A check matrix was used to indicate that an objective did require a certain media characteristic.

For a detailed discussion of the procedures used in academic and hands-on media selection, refer to Report No. 31, "F-16 Training Media Mix".

	Panel mockup 1:1	Cockpit mockup 1:1	Stick & Throttle (auto)train	SMS Trainer (automated)	Avionics display(automated)	2D device, isolated sys act	RWR Trainer (automated)	ICPT	CFT	EPT	DSS	ASPT	SAAC	OFT	OFT & NVS	OFT & DRLMS	OFT & EW	WST	F-16A Aircraft	F-16B Aircraft
Physical Layout Characteristics																				
conformity with shape	X	X	X				X	X	X	X		X		X	X	X	X	X	X	X
between-panel spatial relations		X						X	X	X		X		X	X	X	X	X	X	X
within-panel spatial relations	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X
Stimulus properties-interior																				
fidelity of visual stimulus	X	X	X	X	X		X	X	X	X		X		X	X	X	X	X	X	X
fidelity of aud(non voice) stim						X	X										X		X	X
fidelity of stimulus																			X	X
voice stimulus capability																			X	X
stimulus properties-exterior																			X	X
20 horiz and 20 vert. F.O.V.																				
360 horiz and 360 vert. F.O.V.											X			X						
correct proportion of distant obj																				
correct coloration & shading-obj												X	X						X	X
correct visual sensation-motion																			X	X
correct shape of objects												X	X						X	X
correct resolution-detail											X	X							X	X
distance given																				
Manipulative properties																			X	X
fidelity of manipulation																				
timely manip-resp connection			X				X	X		X		X		X	X	X	X	X	X	X
Response properties			X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X
fidelity of interior response				X	X		X	X		X	X	X		X	X	X	X	X	X	X
fidelity of exterior response				X	X		X	X		X	X	X		X	X	X	X	X	X	X
Instructional features																				
instructor view of stud.displays					X	X	X	X	X	X	X		X	X	X	X	X	X		
stop action capability							X	X		X		X	X	X	X	X	X	X		
canned demo capability														X	X	X	X	X		
live demo capability	X	X	X	X	X	X	X	X	X	X			X							X
conditions reset capability	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X		
Evaluation features																				
R/W feedback			X	X	X	X		X												X
out of tolerance feedback												X		X	X	X	X	X		X
instructor feedback	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
replay of student performance						X		X												
Opponent																				
maneuver opponent													X	X	X	X		X	X	X
Non-moving opponent											X		X	X	X	X		X	X	X

FIGURE 3.1.1 INITIAL HANDS-ON MEDIA SELECTION MATRIX

	Objective Number																
	1.6.1.1	1.6.1.2	1.6.1.2.2	1.6.1.3.1	1.6.1.3.2	1.6.1.3.3	1.6.1.3.4	1.6.1.4.1	1.6.1.4.2	1.6.1.4.3	1.6.1.5	1.6.2	1.6.3.1	1.6.3.2	1.6.3.3	1.6.3.4	1.6.3.5
PHYSICAL LAYOUT CHARACTERISTICS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Conformity With Shape		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Between-Panel Spatial Relations		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Within-Panel Spatial Relations		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
STIMULUS PROPERTIES - INTERIOR																	
Fidelity of Visual Stimulus		✓	✓	✓	✓			✓		✓	✓	✓	✓	✓			✓
Fidelity of Aud (non voice) Stim																	
Fidelity of Kinesthetic Stimulus																	
Voice Stimulus Capability		✓	✓			✓	✓	✓	✓	✓				✓	✓	✓	
STIMULUS PROPERTIES - EXTERIOR																	
Field of View		✓	✓			✓	✓	✓	✓	✓		✓	✓		✓	✓	
Proportion of Distant Obj		✓	✓			✓	✓	✓	✓	✓		✓	✓		✓	✓	
Coloration and Shading - Obj		✓	✓			✓	✓	✓	✓	✓		✓	✓		✓	✓	
Visual Sensation - Motion		✓	✓			✓	✓	✓	✓	✓		✓	✓		✓	✓	
Shape of Objects		✓	✓			✓	✓	✓	✓	✓		✓	✓		✓	✓	
Resolution - Detail Given Distance		✓	✓			✓	✓	✓	✓	✓		✓	✓		✓	✓	
MANIPULATIVE PROPERTIES																	
Fidelity of Manipulation		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Timely Manip-Resp Connection		✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
RESPONSE PROPERTIES																	
Fidelity of Interior Response		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fidelity of Exterior Response		✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
INSTRUCTIONAL FEATURES																	
Instructor View of Stud. Displays		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Action Capability		✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
Canned Demo Capability																	
Live Demo Capability						✓	✓	✓	✓	✓		✓			✓	✓	
Conditions Reset Capability		✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
EVALUATION FEATURES																	
R/W Feedback					✓												
Out of Tolerance Feedback		✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
Instructor Feedback		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Replay of Student Performance																	
OPPONENT																	
Maneuver Opponent		✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
Non-Moving Opponent																	

FIGURE 3.1.2 HANDS-ON MEDIA SELECTION WORKSHEET

3.2 MEDIA BY CAPABILITY MATRICES

The Academic Media by Capability Matrix was designed with the academic media, i.e., CAI plus lesson guide, listed in the top columns and the academic media capabilities, i.e., audio-voice, listed down the right side. A rating scale of 1 to 5 was used. An explanation of the scale follows.

1. POOR - This is the medium of last resort. Effectiveness, efficiency, scope and the flexibility are poor. There may be almost complete reliance on secondary media and there is a potential for negative affect.
2. ADEQUATE - This medium is acceptable, but weak. The scope and flexibility are limited and both effectiveness and efficiency are poor. There may be a strong dependence on secondary media.
3. GOOD - This medium will teach the objective adequately. It is reasonably effective, efficient, and flexible. It will provide the most commonly required instructional instances.
4. DESIRABLE - This is a good medium for the objective. It is efficient, effective, and flexible. A broad range of possible instructional instances are available, and there is potential for positive affect.
5. IDEAL - This is the best medium for the objective. Its efficiency, effectiveness, and flexibility are outstanding. The scope is adequate for the full range of possible instructional instances and there is a likelihood of positive affect.

The hands-on media by capability matrix was designed in like manner, but with hand-on media listed across the top instead of academic media. The rating scale and method of utilization were identical. This matrix updated and replaced the initial hands-on media selection matrix shown on page number 9.

ACADEMIC MEDIA

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	DISPLAY	
CAI + Lesson Guide																																		Audio-Voice
CAI + Videotape + LG																																		Audio
CAI + Videotape + Part Task Trainer + LG																																		Tactile
Interactive Part Task Trainer + LG																																		Kinesthetic
Random Access Slide + LG																																		Visual
Motion Picture + LG																																		Text
Videotape + LG																																		Pictorial
Videodisc + LG																																		Diagrams/Drawing
Tape Slide + LG																																		Spatial layout
Suitcase Projector + LG																																		Motion
Workbook + LG																																		Color
Color Workbook + LG																																		RESPONSE
Workbook + Slides + LG																																		Verbal/Written
Workbook + Audio + LG																																		P-T-M
Programmed Text + LG																																		Manipulate
Training Manuals + LG																																		Covert
Model/Actual Equipment + LG																																		EVALUATION
CRT + LG																																		Instructor
CRT + Tapeslide + LG																																		Automated
Lecture + LG																																		Peer
Lecture + Audio + LG																																		Student Self Scored
Lecture + Visual Motion + LG																																		W/Feedback
Lecture + Model/Actual Equipment + LG																																		Frequency
Lecture + Student Response System + LG																																		Immed/Response
Tutorial + LG																																		Immed/Error
Tutorial + Audio + LG																																		Periodic
Tutorial + Visual Motion + LG																																		Post-Session
Tutorial + Model/Actual Equipment + LG																																		CONTENT
Seminar + LG																																		Correct Answer
Seminar + Audio + LG																																		Rt/Wrong Elaborated
Seminar + Visual Motion + LG																																		Branch to New Displ
Seminar + Model/Actual Equipment + LG																																		SPECIAL REQS.
																																		Crew/Team Int.
																																		Environment
																																		Motion
																																		Time Variability

FIGURE 3.2.1 ACADEMIC MEDIA BY CAPABILITY MATRIX

	Panel Mockup	Cockpit Mockup	Stick & Throttle Trainer	SMS Trainer	Avionics Display	2-D Device	RWR Trainer	ICPT	CFT	EPT	DSS	ASPT	SAAC	OFT	OFT + NVS	OFT + DRLMS	OFT + EW	WST	F-16 A Aircraft	F-16 B Aircraft	3D Model	
1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	PHYSICAL LAYOUT CHARACTERISTICS
2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Conformity with Shape
3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Between-Panel Spatial Relations
4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Within-Panel Spatial Relations
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	STIMULUS PROPERTIES-INTERIOR
6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Fidelity of Visual Stimulus
7	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Fidelity of Aud (non-voice) Stim
8	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Fidelity of Kinesthetic Stimulus
9	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Voice Stimulus Capability
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	STIMULUS PROPERTIES - EXTERIOR
11	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Field of View
12	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Proportion of Distant Obj.
13	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Coloration and Shading - Obj.
14	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Visual Sensation-Motion
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Shape of Objects
16	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Resolution - Detail Given Distance
17	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	MANIPULATIVE PROPERTIES
18	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Fidelity of Manipulation
19	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Timely Manip-Resp. Connection
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	RESPONSE PROPERTIES
21	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Fidelity of Interior Response
22	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Fidelity of Exterior Response
23	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	INSTRUCTIONAL FEATURES
24	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Instructor View of Stud. Displays
25	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Stop Action Capability
26	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Canned Demo Capability
27	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Live Demo Capability
28	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	EVALUATION FEATURES
29	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	R/W Feedback
30	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Out of Tolerance Feedback
31	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Instructor Feedback
32	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Replay of Student Performance
33	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	OPPONENT
34	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Maneuver Opponent
35	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Non-moving Opponent

FIGURE 3.2.2 ACADEMIC MEDIA BY CAPABILITY MATRIX

3.3 ACADEMIC MEDIA SELECTION WORKSHEET

The Academic Media Selection Worksheet was designed such that the objective reference numbers were listed down the left side and the instructional media requirements, i.e., key scored evaluation, were listed along the top. The appropriate boxes were checked giving a profile of the required instructional media requirements for each objective. Note the parallel between this form and the hands-on media selection worksheet shown on page number 10.

INSTRUC- TIONAL REQ.	ORIENT- ING REF. NUMBER	1.1.2.4.12. 3/1.1	1.1.2.4.13 /1	1.1.2.4. 13/1.1	1.1.2.4. 14/1	1.1.2.4. 14/1.1	1.1.2.4. 15/1	1.1.2.4. 15/1.1	1.1.2.4. 15/1.1.1	1.1.2.4. 15/1.1.2	1.1.2.4. 15/1.1.3
CLASSIFICATION											
R/P (VERBATIM)											
R/P (PARAPHRASED)											
R/F (SYMBOL/NAME)											
R/F (FUNCT/LOC)											
R/F (LIM/TOL/CV)											
R/F (LISTS)											
R/F (SEQUENCES)											
U/C											
U/R											
DISPLAY											
AUDIO-VOICE											
AUDIO											
TACTILE											
KINESTHETIC											
VERB/TEXT											
PICTORIAL											
DIAG./DRAWINGS											
SPATIAL LAYOUT											
MOTION											
COLOR											
RESPONSE											
VERBAL/WRITTEN											
POINT/TOUCH/MARK											
MANIPULATE											
EVALUATION											
KEY SCORED											
INSTRUCTOR											
AUTOMATED											
FEEDBACK											
IMMED/RESP											
IMMED/ERROR											
PERIODIC											
POST-SESSION											
CORRECT ANSWER											
R/W ELAB.											
BRANCH											
SPECIAL											
TEAM INTERACTION											
ENVIRONMENT											
MOTION											
TIME VARIABILITY											
LEARNER CONTROL											

FIGURE 3.3 ACADEMIC MEDIA SELECTION WORKSHEET

3.4 MEDIA PRIORITY BY SEGMENT SHEET

The Media Priority by Segment Sheet contained the segment number (a segment consisted of the academic objectives necessary to accomplish a higher order task, i.e., prepare an enroute map); the segment name, i.e., enroute mission planning; the near term media selected and its priority (indicated by a 1 - 5 rating scale, 1 indicating that the near term media selected is of the highest priority and much consideration should be given before changing to an alternate media, a 5 indicating a low priority for the near term media and signifiying the near term alternate media selected is equally acceptable); the near term alternate media and the ultimate media.

Segment Number	Segment Name	MEDIA				
		Near Term	Priority	Near term Alternate	Ultimate	Comments
152	Navigation Using Ground Map Radar	Seminar	2	Lecture - R.S. & L.G.	Tutorial W/L.G.	
153	Radar Jamming	Seminar	2	Lecture - Response System L.G.	Tutorial W/L.G.	
154	Radar & Navigation	Seminar	2	Lecture - R. Sys. & L.G.	Tutorial W/L.G.	
155	Basic G.M.P. Radar	Seminar	2	Lecture - R.S. & L.G.	Tutorial W/L.G.	
156	I.N.S. Updates	Seminar w/equip	2	Lecture - R.S. & L.G.	CAI	
157	Radar Altitude Calculation	Seminar w/equip	2	Lecture - R.S. & L.G.	CAI	
158	A.R.A. Procedure	Seminar w/L.G.	2	Lecture - w/R.S. L.G.	Tutorial w/L.G.	
159	Air to Ground Fence Check	Seminar w/L.G.	2	Lecture R.S. & L.G.	CAI	
160	Procedure for making T.O.T.	Seminar w/L.G.	2	Lecture R.S. & L.G.	CAI	

FIGURE 3.4 MEDIA PRIORITY BY SEGMENT SHEET

3.5 MEDIA SELECTION TALLY SHEET

The media selected were tallied according to near term, near term alternate and ultimate selections and by phase, i.e., Conversion, NAV, Intercept, etc. For example, the Tally Sheet for BFM phase, near term media, might have indicated 4 workbooks plus lesson guide, 3 tapeslides plus lesson guide, and 15 seminars with visual motion and lesson guides. Each Tally Sheet consisted of the appropriate heading, i.e., Near Term, BFM and a listing of the 32 possible academic media.

Defined Media - Academic

- 1 CAI - Lesson guide
- 2 CAI - Videotape - Lesson guide
- 3 CAI - Videotape - Part task trainer - Lesson guide
- 4 Interactive part task trainer - Lesson guide
- 5 Random access slide - Lesson guide
- 6 Motion picture - Lesson guide
- 7 Videotape - Lesson guide
- 8 Videodisc - Lesson guide
- 9 Tape slide - Lesson guide
- 10 Beseler Cue-See - Lesson guide
- 11 Workbook - Lesson guide
- 12 Color workbook - Lesson guide
- 13 Workbook - Slides - Lesson guide
- 14 Workbook - Audio - Lesson guide
- 15 Programmed text - Lesson guide
- 16 Training manuals - Lesson guide
- 17 Model/actual equipment - Lesson guide
- 18 Cockpit Familiarization Trainer - Lesson guide
- 19 Cockpit Familiarization Trainer - Tape slide - Lesson guide
- 20 Lecture - Lesson guide
- 21 Lecture - Audio - Lesson guide
- 22 Lecture - Visual motion - Lesson guide
- 23 Lecture - Model/actual equipment - Lesson guide
- 24 Tutorial - Lesson guide
- 25 Tutorial - Audio - Lesson guide
- 26 Tutorial - Visual motion - Lesson guide
- 27 Tutorial - Model/actual equipment - Lesson guide
- 28 Seminar - Lesson guide
- 29 Seminar - Audio - Lesson guide
- 30 Seminar - Visual motion - Lesson guide
- 31 Seminar - Model/actual equipment - Lesson guide
- 32 Lecture - Student response system - Lesson guide

Defined Media - Hands-on

- 1 Panel mockup 1:1
- 2 Cockpit mockup 1:1
- 3 Stick and throttle trainer (automated)
- 4 SMS trainer (automated)
- 5 Avionics display (automated)
- 6 Active 2-dimensional isolated system trainer
- 7 Radar Warning Receiver Trainer (RWRT)
- 8 Interactive Cockpit Procedures Trainer (ICPT)
- 9 Cockpit Familiarization Trainer (CFT)
- 10 Egress Procedures Trainer (EPT)
- 11 DSS
- 12 ASPT
- 13 SAAC
- 14 Operational Flight Trainer (OFT)
- 15 Operational Flight Trainer - Night Visual System (OFT-NVS)
- 16 Operational Flight Trainer - Digital Land Mass Radar System (OFT-DLMRS)
- 17 Operational Flight Trainer - Electronic Warfare (OFT-EW)
- 18 Weapons System Trainer (WST)
- 19 F-16A Aircraft
- 20 F-16B Aircraft
- 21 3D model or actual equipment

FIGURE 3.5 ACADEMIC MEDIA SELECTION TALLY SHEET

4.0 PERSONNEL MANAGEMENT

A large-scale ISD project is in part an evolutionary process. Occurrences and analyses early in the project may determine later events. Personnel output must be monitored during the project to determine whether the project is on schedule and whether initial time estimates used to calculate staffing levels were accurate. The data collected can be used to update production scheduling during the project and to allow changes in scheduling to minimize the chance of bottleneck later. The data may also be used to reassign personnel or project personnel staffing level as needed.

4.1 WEEKLY TIME SUMMARY SHEET

The Weekly Time Summary Sheet indicated the number of hours spent daily by each instructional writer on individual segments and the total hours spent on all segments. The days of the week were listed down the left side with a total at the bottom. These were four columns across the top for four separate segments (lessons) and the hours spent on each segment. As an example, on Monday, 2 hours were spent on WB110, 1 hour on AS108 and 3 hours on WB121. The total column for the week might indicate 14 hours were spent working on WB110. There was also a space for total hours that indicated the total hours spent working on all segments.

NAME ALAN BIDDLE

WEEK OF NOV 26-30, 1979

Segment No.	Hours	Segment No.	Hours	Segment No.	Hours	Segment No.	Hours	
SME 105	3	SM 101	2	WB 206	1	AS 116	2	MON
"	2	"	2			"	1	TUES
"	4			"	2			WED
		"	2	"	2	"	4	THUR
"	2	"	2	"	1			FRI
SME 105	11	SM 101	8	WB 206	6	AS 116	7	TOTAL

TOTAL HOURS 32

FIGURE 4.1 WEEKLY TIME SUMMARY SHEET

5.0 PRODUCTION MANAGEMENT

During the ISD project, many segments of instruction were in different stages of production at the same time. It was crucial that the progress of each segment be carefully monitored through the production cycle. An effective method to accomplish this was provided by the production management forms described in the following section.

5.1 PRODUCTION MANAGEMENT FORMS

Production Management Forms were constructed to document and facilitate the progress of workbooks, tape (audio) slides, workbook slides and seminars. The main stages of progress documented were the writer/SME stages (outline, rough draft, etc.), graphic stages (art, construction of dummy books, etc.) and word processing stages. The workbook forms were also used to record the progress of seminars.

TAPE SLIDE

	Date In	Date Out	Initials
<input type="checkbox"/> IW/SME Produce Outline			
<input type="checkbox"/> Quality Control Outline			
<input type="checkbox"/> Writer Produces Draft Script and Visual Specs			
<input type="checkbox"/> Word Process Draft Script			
<input type="checkbox"/> SME Reviews Draft Script & Visual Specs			
<input type="checkbox"/> Writer Revises Script and Visual Specs			
<input type="checkbox"/> Quality Control Script and Visual Specs			
<input type="checkbox"/> Edit Script			
<input type="checkbox"/> Produce Sketches			
<input type="checkbox"/> Narrate Scratch Tape			
<input type="checkbox"/> IW/SME Review			
<input type="checkbox"/> SSME Review			
ART			
<input type="checkbox"/> Sketches sent to Hughes Aircraft			
<input type="checkbox"/> Writer/SME Review			
PHOTO			
<input type="checkbox"/> SME Develops Shooting Schedule			
<input type="checkbox"/> Graphics Coordinator schedules Photographer (enter available dates/time)			
<input type="checkbox"/> SME Schedules aircraft/equipment (enter shooting date/time)			
<input type="checkbox"/> SME and Photographer Take Pictures			
<input type="checkbox"/> Photos Delivered			
<input type="checkbox"/> SME/IW/GC Review Photos			
<input type="checkbox"/> SSME Pre Trial Review			
<input type="checkbox"/> Ed Spec Pre Trial Review			
<input type="checkbox"/> Conduct Tryout			
<input type="checkbox"/> Writer Revisions Specification			
<input type="checkbox"/> Revise Script			
<input type="checkbox"/> Revise Graphics			
<input type="checkbox"/> Re-shoot Photos			
<input type="checkbox"/> Script sent to Narrator			
<input type="checkbox"/> Writer/SME Review			
<input type="checkbox"/> Assemble Master			
<input type="checkbox"/> Edit Master			
<input type="checkbox"/> USAF Acceptance			

FIGURE 5.1 PRODUCTION MANAGEMENT FORMS FOR THE SLIDE PROGRAMS

WORKBOOK

	Date In	Date Out	Initials
<input type="checkbox"/> Writer/SME produce outline			
<input type="checkbox"/> Quality Control Outline			
<input type="checkbox"/> Writer/SME produce draft (w/visual specs)			
<input type="checkbox"/> Word Process Draft			
<input type="checkbox"/> SME reviews draft			
<input type="checkbox"/> Writer revises draft			
<input type="checkbox"/> Quality Control Draft			
<input type="checkbox"/> SSME Review			
<input type="checkbox"/> WP Semi Final Draft			
<input type="checkbox"/> Writer/SME produce dummy book			
<input type="checkbox"/> Edit Semi Final Draft			
<input type="checkbox"/> Produce Graphics--thumbnail			
<input type="checkbox"/> Writer/SME Review			
<input type="checkbox"/> Produce Final Graphics			
<input type="checkbox"/> Writer/SME Review of Final Graphics			
<input type="checkbox"/> SSME / Ed Spec Review			
<input type="checkbox"/> Produce Tryout Copy (Graphics)			
<input type="checkbox"/> Conduct Tryout			
<input type="checkbox"/> Produce Revision Specs			
<input type="checkbox"/> Revise Text			
<input type="checkbox"/> Word Process Revisions			
<input type="checkbox"/> Revise Graphics			
<input type="checkbox"/> SSME Final Review of Revisions			
<input type="checkbox"/> Produce Final Master			
<input type="checkbox"/> Edit Master			
<input type="checkbox"/> USAF Acceptance			

FIGURE 5.1.2 PRODUCTION MANAGEMENT FORM FOR WORKBOOK PROGRAMS

WORKBOOK/SLIDE

	Date In	Date Out	Initials
<input type="checkbox"/> IW/SME Produce Outline			
<input type="checkbox"/> Quality Control Outline			
<input type="checkbox"/> Writer Produces Draft Text w/Visual Specs			
<input type="checkbox"/> Word Process Draft Text			
<input type="checkbox"/> SME Reviews Draft			
<input type="checkbox"/> Writer Revises Draft			
<input type="checkbox"/> Quality Control Draft			
<input type="checkbox"/> SSME Review			
<input type="checkbox"/> WP Semi Final Draft			
<input type="checkbox"/> Writer/SME Assembles dummy book			
<input type="checkbox"/> Edit Semi Final Draft			
<input type="checkbox"/> Produce Sketches			
<input type="checkbox"/> IW/SME Review			
ART			
<input type="checkbox"/> Sketches Sent To Hughes Aircraft			
<input type="checkbox"/> Writer/SME Review			
PHOTO			
<input type="checkbox"/> SME Develops Shooting Schedule			
<input type="checkbox"/> Graphics Coordinator Schedules Photographer (enter avail. dates/time)			
<input type="checkbox"/> SME schedules Aircraft/Equipment (enter shooting date/time)			
<input type="checkbox"/> SME and Photographer Take Pictures			
<input type="checkbox"/> Photos Delivered			
<input type="checkbox"/> SME/IW/GC Review Photos			
<input type="checkbox"/> SSME/Ed Spec Pre Trial Review			
<input type="checkbox"/> Conduct Tryout			
<input type="checkbox"/> Produce Revision Specs			
<input type="checkbox"/> Revise Text			
<input type="checkbox"/> Revise Graphics			
<input type="checkbox"/> Reshoot Photos			
<input type="checkbox"/> Assemble Master			
<input type="checkbox"/> Edit Master			
<input type="checkbox"/> USAF Acceptance			

FIGURE 5.1.3 PRODUCTION MANAGMENT FORM FOR WORKBOOK/SLIDE PROGRAMS

5.2 WEEKLY PROGRESS REPORT

The Weekly Progress Report was designed to monitor the weekly progress of individual lessons, i.e., WB201. It was divided into phases (Intercept, BFM, etc.) and each lesson in that phase was listed. The writer/SME team and the expected class date for each lesson was listed and the current stage of production (as of each Friday) was indicated. The stage of production was listed as a step number and a description of that step. The production steps were the same as those listed on the Production Management Forms, i.e., word process draft, step number 4.

BFM PHASE

March 18, 1980

Program Number/Title		Writer/SME	Stage of Program	Class date
WB 301	Air-To-Air gun attack & tracking pro.	Clark/Hopler	9 WP semi-final draft	4/30
WB 302	Computed gun attack modes: LCOS & SS.	Clark/Roth	8 SSME Review	4/30
WB 303	Pro. for Air-to-Air weapons system/fence check.	Wild/Roth	9 WP semi-final draft	5/9
WB 304	F-16 energy man. & HUD energy mana. symbology.	Foster/Stuart	9 WP semi-final draft	5/12
SM 301	Basic fighter Maneuvers; Pursuit	Guthrie/Kimmel	9 WP semi-final draft	5/7
SM 302	Basic fighter Maneuvers: Principals & Applica.	Guthrie/Cary	17 Produce Tryout Copy	5/13
SM 303	Principals & techniques for gun attack.	Clark/Hopler	9 WP semi-final draft	5/1
SM 304	Appli. of offen sive BFM	Wild/Clark	18 Conduct Tryout	5/14
SM 305	Zone defense & consid. for offen sive & counter- offensive maneuv.	Guthrie/Pugh	9 WP semi-final draft	5/16
SM 306	Basic fighter Man. Princi of Lead turns reversal & close-in maneuvers.	Wild/Magill	12 Produce Graphics thumbnail	5/20

FIGURE 5.2 WEEKLY PROGRESS REPORT

5.3 PRODUCTION TRACKING CHART

Two types of Production Tracking Charts were developed to indicate the daily status of lessons. They were tacked to the wall and designed with a plastic coversheet that could be easily updated with a grease pencil. It was the writer's responsibility to update the charts daily.

One chart listed the lessons and showed the current stage of production as of that day. The other chart listed the lessons and every step of the production process. As a lesson entered a new production step that step was marked with an X. A lesson that had entered production step 5 would have a series of 5 X's; once the lesson had reached the last step (USAF acceptance) a line was drawn through all the Xs indicating the lesson was finished.

LESSON DESIGNATOR	STAGE OF PRODUCTION DATE <u>10-4-79</u>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WB 111	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WB 112	X	X	X	X	X	X	X	X	X	X	X	X				
WB 114	X	X	X	X	X											
AS 104	X	X	X	X												
AS 105	X	X														
AS 106	X	X	X	X	X	X	X	X	X	X	X					
SM 104	X	X	X	X	X	X	X	X	X							
SMV 105	X	X														
SMV 106	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
WB 201	X	X	X													

FIGURE 5.3 PRODUCTION TRACKING CHART

6.0 PRE-IMPLEMENTATION EVALUATION

Evaluation, both before and during implementation, was critical to a successful ISD project. Pre-implementation evaluation involved tryout of all instructional units by small groups of students. The Student Attitude Questionnaire contained in this section was used for collecting and summarizing student's attitudes toward each lesson. The actual lesson, i.e., Workbook 109, was used to collect and summarize student's comments about technical accuracy and instructional format.

6.1 STUDENT ATTITUDE QUESTIONNAIRE

The Student Attitude Questionnaire was used to collect and summarize student's attitudes towards content, instructional materials, supplementary materials and review questions. There was also an opportunity to comment on the program as a whole.

F-16 AIRCREW TRAINING DEVELOPMENT PROGRAM

Student Attitude Questionnaire

Segment No. _____ Date _____

Segment Title _____

Place a check () in the box which best describes your response to the following questions:

I. CONTENT

1. This segment:

- a. () stands alone
- b. () requires interaction with an instructor
- c. () requires supplementary written materials

2. In relation to learning about the F-16, I considered the instruction:

- a. () extremely relevant
- b. () relevant
- c. () irrelevant
- d. () extremely irrelevant

3. The instruction in this segment was:

- a. () too demanding
- b. () challenging
- c. () not really challenging
- d. () too simple

4. The concepts presented in this segment were:

- a. () clear and very organized
- b. () organized
- c. () not organized
- d. () completely disorganized/confusing

5. The material presented was:

- a. () extremely interesting
- b. () interesting
- c. () somewhat interesting
- d. () boring

FIGURE 6.1 STUDENT ATTITUDE QUESTIONNAIRE

6. The material presented in the segment contained:

- a. ☐ the right amount of information for the time allotted.
- b. ☐ too much information for the time allotted.
- c. ☐ too little information for the time allotted.

II. INSTRUCTIONAL MATERIALS

7. The choice of language and style was:

- a. ☐ very appropriate for the intended audience
- b. ☐ appropriate for the intended audience
- c. ☐ inappropriate for the intended audience

If you checked c, explain why _____

8. The illustrations were:

- a. ☐ always technically correct
- b. ☐ usually technically correct
- c. ☐ not at all technically correct

If you checked b or c, was variance from technical accuracy confusing to you? Explain

9. The illustrations:

- a. ☐ greatly enhanced my understanding of the content
- b. ☐ enhanced by understanding of the content
- c. ☐ did not enhance my understanding of the content

If you checked c, explain why _____

III SUPPLEMENTARY MATERIALS AND REVIEW QUESTIONS

10. The supplementary worksheet and charts were:

- a. ☐ very useful
- b. ☐ useful
- c. ☐ somewhat useful
- d. ☐ not at all useful

FIGURE 6.1 STUDENT ATTITUDE QUESTIONNAIRE

11. The review test:

- a. ☐ covered only the instructional materials
- b. ☐ covered material not presented in the instruction

12. The review questions emphasized:

- a. ☐ information very important to my job
- b. ☐ information important to my job
- c. ☐ some useful information
- d. ☐ trivial/unrelated information

13. Comment on the program as a whole. Point out areas which could be changed to improve the effectiveness of the segment:

FIGURE 6.1 STUDENT ATTITUDE QUESTIONNAIRE

7.0 DATA BASE UPDATE

There were a number of different data bases that required continual update and revision. They included the pilot task analysis, goal analysis, CROs, objectives hierarchies, and program reports. Since changes to one data base often times has implications for other data bases, a systematic procedure for making these changes is required. The following forms were designed to facilitate this process.

7.1 Task Revision Form

The task revision form was used to document the proposed revisions to the pilot task analysis, objectives hierarchies, goal analysis, and criterion-referenced objectives (CROs). The form provided a means for establishing the history, rationale, and impact of a suggested change.

When using the forms, the author fills in the date and his name or initials. He then determines whether the change affects the task listing, CROs, or objectives hierarchies or any combination of these, and checks the appropriate column under "Change to:". Under the "Action to Task" heading, he checks whether the change is an addition (A) of a new task or a deletion (D) or modification (M) of an existing task. If the task already exists, its number is recorded. If the task is being added, there may not be any task numbers unless placement in the task listing has been determined. (Renumbering will be accomplished later by the data base manager). A proper entry in the "Description of Change" column should ensure that the changes are accurately described. For a new task or a task being changed, the latest form of the description is entered. The "Reason for Change" column is completed next. A preliminary indication is then made of which aircraft systems are likely to be affected by the change. This process is repeated for each change input.

7.2 Report Revision Form

The F-16 training project developed a series of thirty-five reports. These reports were changed on an as needed basis to reflect new information.

The change author fills in the date and his name or initials on the Report Revision Form. Next, he enters the title/number of the report being changed. He then determines how the report is affected--whether the change is an addition, deletion, or modification--and checks the appropriate box under the "Action" column. In the next column he enters a description of the change and then describes the reason for the change in the next column. This process is repeated for each change for a particular stored project report.

[illegible]

Figure 2--Report Revision Form.

FIGURE 7.2 REPORT REVISION FORM